NASA Administrator
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I'm honored to participate, especially here at MIT.

In fact, I don't know if there's a better place for the head of NASA to speak about innovation . . . than a place called . . . the Tang Center.

Truth be told, the breakfast of astronauts is not a NASA innovation. We can't claim Velcro or Teflon, either.

We just applied them

But our work . . . exploring the unknown . . . has led to innovations that have propelled our economy and enriched our lives.

So at NASA, we are very optimistic about the future of innovation and the future of our country.

But, to a certain degree, it is a cautious optimism.

Because, as a nation, we sometimes have a misperception of what innovation is.

Apart from the long-range investments that this country is willing to make for health care research . . . for the most part, we think of innovation as what can be done in the short-term.

Innovation is taking small, safe, evolutionary steps . . . not bold revolutionary leaps.

Those steps are improvement.

Often important improvement.

But they are not innovation.

Small, evolutionary steps will not sustain a nation in the global economy.

If we are really serious about spurring innovation, I believe America needs a big vision. The stuff not only of innovation, but inspiration.

I'll give you an example.

America had to be first to the moon.

But back then, we could not use off-the-shelf, modified technology. What we needed for that bold mission was simply not available.

I remember President Kennedy saying in a speech that we would have to use materials that have yet to be invented.

In other words, we had to create the technology.

And through sheer innovation we didn't only get to the moon . . . we helped create the semi-conductor industry along with the Department of Defense. We helped revolutionize the electronics, satellite and emerging software industries.

In short, almost thirty years after the Eagle has landed . . . that bold vision keeps our economy soaring.

That's what true innovation can and should do.

Yet, there's this disconnect.

First, as I said earlier, each year the corporate world's commitment to long-term, high risk research shrinks.

As we define R&D, perhaps we need to break in into two parts: near-term applied research and product development . . . and true long-term, high-risk and high pay-off research.

And second, although we will make these investments in the life sciences . . . we are failing to adequately make these investments in what so often enables scientific and medical breakthrough -- cutting-edge technology and engineering tools.

In many ways, sadly, engineering in America is becoming a second-class citizen.

Think about it.

There has not been a revolutionary change in the long haul jet transports or rocketry since the Apollo era.

We have not had a revolutionary change in the automotive industry in decades.

Even the information systems we're so proud of, where there has been revolutionary changes, we could be approaching the physical, conceptual and economic limits.

Right now, times are good . . . so this investment trend is just a sniffle. Perhaps the beginning of a cold.

But if we do not commit ourselves to building these revolutionary engineering tools and technologies -- real high-risk things because we're not afraid of failure -- the impact on the economy a decade or two from now can be crippling.

At NASA, recognition of that means a bold strategy that doesn't look 2 or 3 years out for turn-around . . . but 25.

We want to detect Earth-sized planets around stars within 100 light years. And we want to do it with a telescope so powerful . . .that we will be able to pick up signs of life if they exist.

600 trillion miles . . .. that's some resolution.

We want to launch self-thinking, self-tasking, and self-repairing probes into interstellar space.

Think of the communications challenge at a trillion miles. And think about how that will improve communications within a couple thousand miles.

We want an astronaut to visit Mars . . . or live in a research station on a near-Earth asteroid.

Like the moon race, we won't get there with modified, off-the-shelf products.

Currently, the problem many of us face in the field of engineering is that we have to commit about 90 percent of the cost . . . when we only have about ten percent of knowledge.

We are left with choosing between sacrificing flexibility . . . or large risking cost and schedule overruns.

Both choices stifle the innovation.

The success of our missions and the future of innovation depends on closing this gap.

That's why at NASA we have a vision to revolutionize engineering . . . and build the tools of the future.

The tools of the future we envision . . . will allow geographically distributed teams to work collaboratively. The development process will follow the sun . . . cutting cycle time and cost.

The tools of the future we envision . . . will fully exploit the potential of total immersion virtual presence.

We'll have sight and sound . . . but also feel and perhaps even smell.

Hopefully, we'll be able to simulate an entire factory before building it . . .

or simulate the entire development life cycle of a car or plane before cutting a single piece of hardware . . .

or simulate the research station on an asteroid before we send people there.

Perhaps most important, the tools of the future we envision won't depend on what we all use today . . . hard, numerical computing.

This has to change.

Instead, we will integrate biology into our traditional way of thinking . . . and computers will more closely resemble the processes of human logic and thought.

We may even have a wet computer.
To put it another way, the tools of the future will encompass the

technologies we can't even imagine today.

But we do know this: 25 -- maybe 50 years from now -- those technologies will be the driving force behind a robust economy.

That's innovation.

Some may say that only the federal government can afford these long-term, high-risk investments. And to some extent, that's true.

We aren't limited to the short-term turn around like so many entrepreneurs. We are not in it for profit.

But I also submit we cannot go at it alone.

We need to provide the resources to adequately fund the academic community.

It is the federal government the funds universities . . . and to some extent private industry, although I think they are lagging behind.

But the fact is, together, we must commit ourselves to developing young minds -- the training and continuing education of the next generation of scientists and engineers.

And we in the federal government also need to work with industry, to make sure that technology transfer is not an afterthought . . . but rather an approach that allows us both to remain aggressive.

That's good for your shareholders . . . and ours . . . the taxpayer.

But let's remember . . . if we care about innovation . . . our goals should be bold . . . where ever we work.

Innovation . . . do we have what we need?

I think that's a big vision.

And at NASA, at other government agencies, in academia and the entrepreneurial community. . . I believe we have it.

And if I'm right . . . we should be optimistic.

Because the future will be bring amazing things . . . even better than Tang and Velcro.

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